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ABSTRACT

Drawing on data from "Prospects: The Congressionally Mandated Study of Educational Growth and Opportunity," this issue brief explores the magnitude of reading and mathematics differences in top and bottom schools. Four types of comparisons are made: (1) comparing the percentile ranks of the average student in the top and bottom quarters of schools at the end of first grade; (2) converting test score differences between students in the top and bottom quarters of schools into a widely used measure called effect size; (3) determining the number of years of schooling the bottom school students are behind the top school students at the end of first grade; and (4) showing how students in the bottom quarter rank on average at the end of first grade relative to students in the top schools and vice versa. In addition, the educational and economic backgrounds of the students attending the top and bottom quarters of schools in achievement are noted. Each of the four approaches show large differences in reading and mathematics achievement at the end of first grade between students in the top and bottom schools. Data on family educational and economic backgrounds also show great differences between the top school students and bottom school students. (HTH)

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ISSUE BRIEF

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First-Graders' Achievement in Top and Bottom Schools

ED 416 022

Most people believe that schools differ widely from one another in their students' achievement, but little is known about the magnitude of these differences, particularly at the early grades of schooling. Drawing on data from *Prospects: The Congressionally Mandated Study of Educational Growth and Opportunity*, we can now address questions in this area.

To describe the magnitude of reading and mathematics differences in top and bottom schools, we ranked a nationally representative sample of *Prospects* schools by the test scores of their students at the end of first grade; then we compared the scores and characteristics of the students in the top- and bottom-ranked quarters of these schools. Since there is no single standard way to compare the scores and characteristics of the students in the top and bottom quarters of these schools, we make the comparison four ways.

The first method compares the percentile ranks of the average student in the top and bottom quarters of schools at the end of first grade. The second approach converts the test score differences between students in the top and bottom quarters of schools into a widely used measure called effect size. The third approach determines the number of years of schooling the bottom school students are behind the top school students at the end of first grade. The fourth method shows how students in the bottom quarter rank on average at the end of first grade relative to students in the top schools and vice versa. We then look at the educational and economic backgrounds of the students attending the top and bottom quarters of schools in achievement.

Achievement Differences Between Top and Bottom Schools

Each of the four approaches shows large differences in reading and mathematics achievement at the end of first grade between students in the top and bottom scoring schools.

The first comparison shows that the average achievement of students attending the top quarter of schools equals that of a student at the 71st percentile in reading and the 70th percentile in mathematics (table 1, line 1). The average achievement of students attending the bottom quarter of schools equals that of a student at the 24th percentile in both reading and mathematics (line 2). Thus, there are 46–47 percentile point differences in achievement between average students in top and bottom scoring schools.

The second comparison converts the average test scores of students in the top and bottom quarters of schools (table 1, lines 1 and 2) into a measure of the size of the difference called an effect size. The effect size is the average achievement difference between students in the top and bottom quarters of schools (line 2 minus line 1) divided by the standard deviation of all students' achievement. The effect size for the achievement difference between students in the top and bottom quarters of schools is 1.15 in reading and 1.13 in mathematics (line 3). Effect sizes of 0.8 and greater are generally considered large. An effect size of 0.8, for example, corresponds to the average difference between the heights of 13-year-old and 18-year-old girls.

Table 1.—First-graders' reading and mathematics achievement in top and bottom schools in spring of first grade

	Reading achievement (and percentile)	Mathematics achievement (and percentile)
1. Average achievement (and percentile) of students attending top quarter of schools	598 (71)	556 (70)
2. Average achievement (and percentile) of students attending bottom quarter of schools	524 (24)	479 (24)
3. Effect size: Achievement difference between students in top and bottom quarter of schools divided by first grade standard deviation	1.15	1.13
4. Achievement difference between students in top and bottom quarter of schools divided by average gain from spring of first grade to spring of second grade	1.10	0.95

NOTE: In reading, the *n* for top schools is 39 and for bottom schools is 36. In mathematics, the *n* for top schools is 36 and for bottom schools is 41.

SOURCE: U.S. Department of Education, *Prospects: The Congressionally Mandated Study of Educational Growth and Opportunity*, 1991, 1992.

The third approach to comparing achievement in the top and bottom schools looks at the difference in achievement between the top and bottom schools at the end of first grade, compared to the average achievement growth in reading and mathematics the next year. The difference in reading achievement between the top and bottom schools at the end of first grade is 1.1 times as large as the reading gain experienced by the average student through the end of second grade (table 1, line 4). The difference in mathematics is 0.95 times as large as the next year's gain. These results imply that the average student in the bottom-ranked schools—if this student gains at the average growth rate of all students—will not reach, after a full year of second grade, where students in the top-ranked schools were at the end of their first grade in reading. By the end of second grade, in the bottom-ranked schools, the average student will just about equal end-of-first-grade performance in the top schools in mathematics.

The fourth comparison shows that the average first-grader among all students achieves at a level exceeding 27 percent of the first-graders in the top quarter schools, but has a score higher than 75 percent of the first-graders in the bottom quarter schools (table 2, lines 1 and 2). Perhaps more striking, the average first-grader in the top schools has achievement exceeding 88–89 percent of the first-graders in the bottom schools, while the average student in the bottom schools exceeds 7–9 percent of the students in the top schools (table 2, lines 3 and 4).

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Table 2.—First-graders' achievement percentiles in top and bottom schools

	Reading achievement	Mathematics achievement
1. Percentile an average student overall would have among students in top quarter of schools	27	27
2. Percentile an average student overall would have among students in bottom quarter of schools	75	75
3. Percentile an average student in top quarter of schools would have among students in bottom quarter of schools	88	89
4. Percentile an average student in bottom quarter of schools would have among students in top quarter of schools	7	9

NOTE: In reading, the *n* for top schools is 39 and for bottom schools is 36. In mathematics, the *n* for top schools is 36 and for bottom schools is 41.

SOURCE: U.S. Department of Education, *Prospects: The Congressionally Mandated Study of Educational Growth and Opportunity*, 1991, 1992.

Family Background Differences Between Students in Top and Bottom Schools

The results in tables 1 and 2 show that students in the top and bottom quarters of a representative sample of American schools differ greatly in reading and mathematics achievement in first grade. Table 3 shows they also differ greatly in the educational and economic backgrounds of their families.

About half the students in the top schools come from households where the average education exceeds high school, while about one-third of the students from the bottom schools come from households where the average education exceeds high school (table 3, line 1). Students in the top schools also come from households with significantly higher incomes than students in bottom schools (table 3, line 2).

Table 3.—Family background differences of first-grade students in top and bottom schools

	Reading achievement		Mathematics achievement	
	Top quarter of schools	Bottom quarter of schools	Top quarter of schools	Bottom quarter of schools
1. Percent of households with average education above high school	48	31	53	31
2. Average household income in 1991	$46,147	$22,773	$48,423	$21,618

SOURCE: U.S. Department of Education, *Prospects: The Congressionally Mandated Study of Educational Growth and Opportunity*, 1991, 1992.

Conclusions

These results show a largely stratified American education system at the end of the first grade—stratified both in achievement and in backgrounds of the students attending them. Such achievement and family differences may be associated with substantial differences between schools in curricular demands, school climates, and levels of parental support.

These differences raise important policy questions that deserve further investigation. Do these large differences in achievement at the end of first grade reflect differences students bring with them upon entering school, differences that occur after starting school, or both? Are the top schools "better" schools than the bottom schools? If this is the case, these results indicate that first-graders in top-ranked schools are much more likely to come from better educated and wealthier backgrounds than first-graders in bottom-ranked schools.

If the top schools have higher achievement than the bottom schools only because they have more privileged educational and economic inputs, and not because the top schools are "better" than the bottom ones, then the wide achievement differences between top and bottom schools reflect educational and economic differences in students' backgrounds even before the end of the first grade.

This **Issue Brief** was prepared by John Ralph and Mary Frase of the National Center for Education Statistics; James Crouse, professor of Educational Studies at the University of Delaware in Newark; and William Thompson of ABT Associates, Inc. Data source: U.S. Department of Education, *Prospects: The Congressionally Mandated Study of Educational Growth and Opportunity*. For more information regarding this **Issue Brief**, please contact John Ralph at (202) 219-2270. To order additional copies of this **Issue Brief** or other NCES publications, call 1-800-424-1616. It may also be found on the Internet at http://www.ed.gov/NCES/pubs/.